Paper 19

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte MICHAEL E. RORABAUGH,
DARRYL F. GARRIGUS and JURIS VERZEMNIEKS

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Appeal 1998-0186
Application 08/464,149[1]

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Before: McKELVEY, Senior Administrative Patent Judge, and SCHAFER and GARDNER-LANE, Administrative Patent Judges.

SCHAFER, Administrative Patent Judge.

Applicants appeal from the final rejection of claims 20-32. We have jurisdiction pursuant ot 35 U.S.C. § 134.

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[1] Application for patent filed 5 June 1995. The application on appeal is based on a division of application 08/209,847, filed 11 March 1994, which is a continuation in part of application 08/040,217, filed 1 April 1993, which is a continuation in part of application 07/945,191, filed 15 September 1992. .

The examiner rejected the claims over the combination of Ardary,[2] Lespade,[3] Bendig[4] and Thompson.[5]

The invention relates to ceramic insulation. Applicants have claimed their invention using both product (claims 20-21) and product-by-process (claims 22-32) format. No claims to a process per se are before us. Claims 20, 22, 26 and 31, the independent claims, are reproduced below:

> 20. Ceramic insulation having a density between about 8-25 lb/ft$^3$ a consistent microstructure, and improved strength, comprising a sol-gel binder fully gelled through the entire thickness of the insulation and a ceramic component selected from the group consisting of ceramic fibers, ceramic microparticles, and mixtures thereof, the insulation optionally including a reacted metal forming refractory ceramic bonds between ceramic components, the insulation being heat treated at about 1000E F to have a tensile strength of at least about 0.244 MPa.
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> 22. A ceramic insulation obtainable by:
> (a) forming a slurry of ceramic fibers, ceramic microparticles, or mixtures thereof, optionally, fugitive microparticles; and optionally, a metal;
> (b) molding a slurry to form a soft felt mat of the ceramic components of the slurry, the mat having a thickness;
> (c) optionally, converting the metal to a binder to form bonds between the ceramic components;
> (d) impregnating the mat with a sol prior to drying the mat;
> (e) gelling the sol to form a sol-gel binder which bonds between the ceramic components so that the mat is dimensionally stabilized; and
> (f) drying the mat to produce the ceramic insulation,
> the insulation having a consistent micro structure, a tensile strength of at least about 0.244 MPa, uniform porosity, and a density of about 15 -22 lb/ft$^3$.
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> 26. A ceramic insulation obtainable by:
> (a) forming a slurry of ceramic components selected from the group consisting of fibers, microparticles, and mixtures thereof:
> (b) molding the slurry to form a wet mat;
> (c) impregnating the wet mat with a sol;

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[2] Ardary et al., U.S. Patent 3,702,279 granted November 7, 1972.

[3] Lespade et al., U.S. Patent 5,126,087 granted June 30, 1992.

[4] Bendig, U.S. Patent 5,041,321 granted August 20, 1991.

[5] Thompson, U.S. Patent 4,632,944 granted December 30, 1986.

(d) diffusing ammonia into the impregnated mat by exposing the mat to a flowing ammonia environment and, thereafter, subjecting the mat to an ammonia soak time in a quiescent ammonia atmosphere sufficient to convert the sol to gel to produce a consistent microstructure throughout the mat;
(e) drying the mat to produce the ceramic insulation; and
(f) heat treating the mat to increase its tensile strength.

31. Ceramic insulation having a density of about 8-25 $lb/ft^3$ obtainable by:
(a) forming a slurry of ceramic components selected from the group consisting of ceramic fibers, ceramic microparticles, and mixtures thereof, and a binding amount of metal powder;
(b) optionally, adding fugitive microballoons or ceramic whiskers or both to the slurry;
(c) molding the slurry to form a mat;
(d) converting the metal powder to an oxide or nitride to form bonds between the ceramic components, the metal being between about 5-50% of the weight of the ceramic components.

Claims presented in product-by-process format are treated, for the purpose of patentability, as claims to the product. In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985); In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). Where the product specified in a product-by-process claim appears to be identical to a product in the prior art, even though made by a different process, the product may be rejected and the burden falls on the applicant to show that the products differ in an unobvious way. In re Marosi, 710 F.2d 799, 803, 218 USPQ 289, 292-93 (Fed. Cir. 1983); In re Best, 562 F.2d 1252, 1255, 195 USPQ, 430, 433-34 (CCPA 1977); In re Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972). In other words, in considering the patentability of a product-by-process claim, the product described by the claim is not considered limited by the process set out in the claims. Scripps Clinic & Research Foundation v. Genentech Inc.; 927 F.2d 1565, 1583, 18 USPQ2d 1001, 1016 (Fed. Cir. 1991). This precedent, however, does not mean that process limitations in the claim are totally irrelevant. Where the process limitations impart characteristics or properties to the product, not shared with or suggested by the prior art product, a rejection would be inappropriate. Thus, a heat treating step which changes the properties to the product would distinguish the product from the unheat-treated prior art product.

Applicants argue with respect to claims 20, 24 and 26 that the references do not teach the strengthening heat treatment. Appeal Brief, p. 5. We cannot agree that the references do not teach a strengthened, heat treated product. Applicants' heat treatment is merely a final heating step. According to applicant's specification, heat treating is the final heating step after gelation and drying. Specification, pp. 16-17. The heat treatment "serves to further stabilize the insulation and to prevent shrinkage during subsequent high temperature service." Specification, p. 17. The heat treatment step also "can increase the strength of the insulation . . . ." Specification, p 17. Ardary, similarly describes a final "heat treatment" which he calls "firing" to stabilize and sinter (and thus strengthen) the insulation after gelation and drying. Ardary, col. 3, lines 20-38. Ardary teaches:

> The dried composite is then fired in air or another suitable oxidizing medium at a temperature of 600 to 1000EC. for a duration of one hour or more depending on the size of the composite but at least sufficient to assure that the interior of the composite has reached the desired firing temperature. This firing step sinters together the particulates in the binder to form a matrix in which the fibers are firmly held. The sintering step effects the burnout of any volatile organic materials present in the composites and effectively shrinks the binder about the fibers to assure that further shrinkage of the insulation does not occur during high temperature use.

Ardary, col. 3, lines 31-44.

While Ardary teaches the heat treatment step which would strengthen the insulation, we have not been directed to any part of the record that teaches a insulation having a tensile strength of "at least .244 M Pa" as required by claims 20-25 and 30. Accordingly, we reverse the rejection as to those claims.

Claim 26, however, does not require that the insulation have any particular tensile strength. There is no limitation in claim 26 which in anyway distinguishes the products disclosed by Ardary and from those claimed by applicant. We affirm the rejection as to claim 26.

Applicants argue that claim 27, and inferentially, dependant claims 28 and 29 have not been shown to be unpatentable since the references do not suggest adding metal powder to the insulation to increase z-axis strength. The z-axis is defined in applicants' specification as the direction perpendicular to the plane in which the fibers in the insulation naturally orient themselves during processing. Specification, p. 6. The examiner argues that the "improved z-axis strength recited in claim 27 is not convincing of error since no minimum z-axis strength is set forth in claim 26 from which it depends." Examiner's Answer, p. 6. We fail to see the significance of the fact that claim 26, does not specify a minimum z-axis strength.[6] The increased z-axis strength is a property of the claimed insulation. Applicants have asserted that the z-axis strengthening is a difference over the insulation described in the cited references and we are not free to ignore it. To adequately answer this assertion, the examiner may show that the statement is incorrect by, for example, showing that the property is expressly taught in a reference or inherently results from the processes described in the references. The examiner may also provide reasoning to explain while one having ordinary skill in the art would have expected that z-axis strength to increase. Since the examiner has not directed us to any relevant teaching or provided adequate reasoning, the z-axis strength limitation can not be considered obvious. We reverse the rejection of claims 27, 28 and 29.

With respect to claims 31 and 32, applicants argue that the inclusion of a binding amount of metal powder in the insulation along with ceramic components is novel. The examiner has not directed us to any evidence in the record which would lead one of ordinary skill in the art to an insulation that included a metal binder. Nor has the examiner provided any explanation why a person having ordinary skill in the art would have been led to an insulation including a metal binder. The rejection of claims 31 and 32 is reversed.

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[6] If the examiner thought the phrase "improved z-axis strength" causes the claims to be indefinite, an appropriate rejection under 35 U.S.C. § 112, ¶ 2, should have been made. Since no such rejection has been made, we assume that one having ordinary skill in the art would understand the metes and bounds of the claimed subject matter.

The rejection of Claim 26 is affirmed. The rejection of claims 20-25 and 27-32 is reversed.[7]

**REVERSED.**

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| FRED E. McKELVEY, Senior<br>Administrative Patent Judge | ) | |
| RICHARD E. SCHAFER<br>Administrative Patent Judge | ) | BOARD OF PATENT APPEALS AND INTERFERENCES |
| SALLY GARDNER-LANE<br>Administrative Patent Judge | ) | |

[7] A reversal of an appealed rejection should not be construed as an affirmative indication that the applicants' claims are patentable. We address only the positions and rationale as set forth by the examiner and applicants, mindful that the examiner has the burden of proving unpatentability. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

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